REMARKS

Claims 1-27, 29-31, 33-42 and 48-52 are pending in the application, with Claims 28, 32 and 43-47 being canceled herein. Of these pending claims, Claims 19-22 and 48-52 stand withdrawn from consideration, Claims 1-12, 14-18, 23-46 are rejected, and Claims 13 and 47 are objected to. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

SPECIFICATION

The specification stands objected to for certain informalities. Applicants have amended the specification according to the Examiner's suggestions. Therefore, reconsideration and withdrawal of this objection are respectfully requested.

CLAIM OBJECTIONS

The Examiner's attention is directed to Claims 13, 17, 24, 33, 34, 40 and 41 which have been amended to overcome the claim objections.

REJECTION UNDER 35 U.S.C. § 112

Claims 18 and 41 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicants regard as the invention. Applicants have amended Claims 18 and 41 to overcome the rejections.

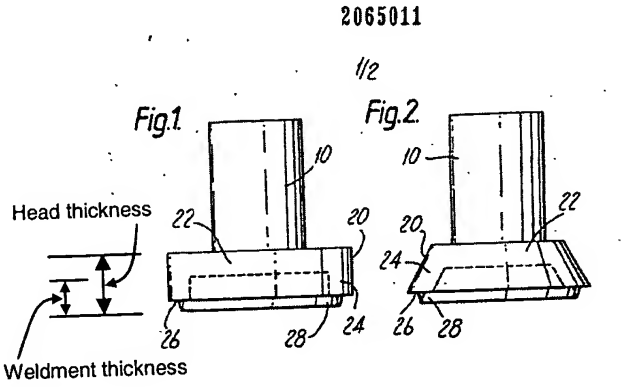
DOUBLE PATENTING

The Examiner's attention is directed to the signed enclosed Terminal Disclaimer which overcomes the double patenting rejection.

REJECTION UNDER 35 U.S.C. § 102

Claims 1-3, 5-7, 8-10, 14-16, 18, 23-26, 28-34, 37-39, and 41-44 stand rejected under 35 U.S.C. 102(b) as being anticipated by GB Application 2,065,011. The Office Action states that each of the limitations of these claims is taught within this reference. Applicants respectfully traverse this characterization.

As amended, independent Claims 1, 8, and 23 contain the limitation that the annular weldment area has a thickness being less than 50% of the first head thickness. The '011 reference is silent as to the dimensions of the thickness of the cylindrical-shaped ring 24 and 28.



As can be seen in figures 1 and 2 of the '011 reference, the weldment area has a thickness being GREATER than 50% of the head thickness, as such, the '011 reference does not anticipate the claims of the instant application.

Claims 1-3, 8-10, 14-16, 18, 23-26, 28-34, 37-39, and 42-44 stand rejected under 35 U.S.C. 102(b) as being anticipated by Soyer DE 4,222,664 A1. The Office Action states that each of the limitations is taught in the reference. Applicants respectfully traverse this characterization. The Examiner's attention is directed to the enclosed translation of the Soyer reference. The reference is specifically silent about this matter and further in the brief description of the figures states that the figures are "not to scale." As further shown on page 5 of the translation, the sizes cited in the table are with respect to the weld nuts and not the claimed weld studs.

As can be seen, Soyer does not teach a weldable fastener having an exterior threaded body with an annular weldment area having a thickness, which is less than 50% of the thickness of the head as claimed in the instant application. Further, Soyer does not teach the annular weldment area having a thickness of between 20-30% of the head thickness. As such, the '011 reference does not anticipate the claims of the instant application.

Claims 1, 3, 8-10, 14-16, 23-24, 26, 31-34, and 42-44 stand rejected under 35 U.S.C. 102(b) as being anticipated by DE 44 32 550 C1 (Musikowski). The Office Action states that each of the claimed limitations is found in the cited reference. Applicants respectfully traverse this characterization. The '550 reference a weld nut which is welded to an aperture formed within a sleeve of a metal structure. The '550 reference does not teach a weld fastener having external threads or a head. In this regard, the '550 reference teaches a cylindrical weld nut having an internal tread and an annular weld flange disposed on an outside surface of the weld. Additionally, the '550 reference does not teach the dimensional limitations as claimed. Specifically, it does

not teach the weldment thickness less than 50% or the weldment thickness being 20 to 35% of the head thickness. As such, the '011 reference does not anticipate the claims of the instant application.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-3, 8-10, 14-16, 18, 31-34, 37-38, and 41-44 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Logan (U.S. Patent No. 3,279,517) in view of Clyne, Krieder (U.S. Patent No. 4,799,842) and the background of the instant application. These rejections are respectfully traversed. The Office Action states that the Logan reference essentially teaches each of the elements of the claimed weld fastener and uses the other references to suggest that the use of these weld nuts or a metallic laminate is obvious. Applicants respectfully traverse this characterization and specifically traverses that Logan teaches the limitations of the fastener.

Logan teaches a weld bolt having a head (11) configured to be welded to a convex surface (13). The head (11) has a plurality of discrete peaks (15, 16, 17, 18) from the head. These peaks are formed at angular surfaces (16°). Logan simply does not teach a continuous annular weldment surface. Further, Logan does not teach or suggest the dimensional limitation as claimed.

The Logan reference is specifically designed to be resistant welded to a convex surface 13 (column 1, lines 52-55 of the Logan reference). It does not in any way teach or suggest the use of this weld stud with a thin laminate sheet. Applicants assert that there is no suggestion that this stud would even function to form an acceptable joint

when welded to a thin sheet. As such, there is no motivation to combine Logan with the other references.

The Krieder reference teaches a weld stud having a nut cap. The nut cap is configured to prevent weldment or paint to follow the threads of the weld stud. Krieder does not teach an annular weldment area.

ALLOWABLE SUBJECT MATTER

The Examiner states that Claims 13 and 47 would be allowable if rewritten in independent form including all of the limitations in Claim 2 of U.S. Patent No. 6,818,851. Claims 18 and 41 would be allowable if rewritten in independent form including all of the limitations in Claim 4 of U.S. Patent No. 6,818,851. Claims 13 and 14 would be allowable if rewritten to overcome the objections while maintaining all of the limitations stated within the claims. Accordingly, Applicants have amended Claim 18 to include the cited limitations of Claim 2 of the U.S. Patent No. 6,818,851. Therefore, Claim 18 should now be in condition for allowance.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the

Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: April - 2005

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[Translation from German]

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GERMAN PATENT OFFICE

(12) Letters of Disclosure

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The following data are taken from the documents submitted by the Applicant.

Examination requested pursuant to § 44 Pat. Act.

(54) **Connecting element for use in bolt welding**

(57) Connecting element for use in bolt welding by means of short-time lift ignition, in the form of a tubular hollow object such as an internally threaded bushing, a welding nut and the like, having an annular welding attachment (4), characterized in that in the outer portion of the end face (3) of the hollow-object connecting element (1), inside the annular welding attachment (4), a groove (5) running concentric therewith and extending into the connecting element (1) is configured.

[Figures]

Description

The invention relates to a connecting element for use in bolt welding by means of short-time lift ignition, [for objects] such as T-bolts, threaded bolts, tubular hollow objects such as internally threaded bushings, welding nuts and the like.

In bolt welding by means of short-time lift ignition, the ratio of the minimum sheet-metal thickness to the bolt diameter is at most 1:8. This means that even in bolt welding by means of short-time lift ignition, for example in motor vehicle construction, with the sheet-metal thicknesses of 0.6 mm or less there employed, in principle not even bolts 5 mm in diameter are welded. However, in cases in which for example bolts are for example used and employed to produce a mass connection for electrical components, modules and the like, a secure and lasting, really good mass connection can be achieved only if the available area can be utilized as extensively as possible.

Further, in the welding of hollow objects having continuous threads, such as for example welding nuts, it is hardly avoidable, and impossible to rule out the possibility, that weld splashes may settle in the lower threads, rendering such welding nuts practically unserviceable, or, if at all possible, they are very time-consuming and troublesome to remove.

The object of the invention, then, is to create a connecting element for use in bolt welding by short-time lift ignition that can be welded on securely and reliably over a large area, where, in the case of hollow-object connecting

elements, for example those having continuous internal threads, the thread is prevented from being rendered unserviceable in the lowermost region by weld splashes or the like.

This object is accomplished, according to the invention, in that in the outermost marginal portion of a connecting element, an annular attachment is provided, as a result of which the connecting element can be welded on over a large area; the actual welded connection, however, has taken place only in the region of the comparatively narrow annular surface. Hence, the initially mentioned relationship between sheet-metal thickness and diameter of connecting element of maximally 1:8 is neither exceeded nor even approximately attained. However, the great area covered by the welded-on annular attachment creates a secure connection effected by short-time lift ignition along the outer periphery of a connecting element, and thereby for example the contact area for a mass connection between connecting element and a base material, such as for example thin sheet-metal, is considerably enlarged.

In another advantageous conformation, in particular for welding connecting elements in the form of hollow objects having a continuous thread, for example welding nuts, a groove is configured inside the annular attachment, running concentric therewith. As expensive experiments by Applicant have shown, this safely prevents weld splashes from getting into the lowermost threads of welding nuts or unwanted welding material preventing the use of welding nuts, for example, as intended, from getting into the threads and settling there. Therefore, in the outer face region, the so-called welding face, in

especially simple and advantageous manner, an undercut-free and largely beadless welding of flat welding nuts by means of short-time lift ignition is made possible.

According to another advantageous conformation of the invention, the annular attachments may in cross-section exhibit almost any conceivable shape; preferably, they may be square or rectangular, but may likewise be configured trapezoidal, triangular or for example tapering down to a point.

The invention will now be illustrated in more detail in terms of preferred embodiments by way of example, with reference to the drawing. In the drawing:

Fig. 1a schematically shows a representation, not to scale, partly cut open, of an embodiment of a connecting element in the form of a welding nut with annular attachment;

Fig. 1b schematically shows a representation, not to scale, partly cut open, of an embodiment of a connecting element in the form of a welding nut with annular attachment and groove running parallel thereto;

Fig. 2a, likewise schematically, shows a sectional representation, not to scale, of another embodiment of a connecting element in the form of a hollow object with continuous internal thread, with flange, and

Fig. 2b, likewise schematically, shows a sectional representation, not to scale, of another embodiment of a connecting element in the form of a threaded bolt in solid material with flange.

Fig. 1a, partly cut open, schematically shows a representation, not to scale, of a connecting element in the form of a welding nut 1 having an internal

thread 2. In the outermost region of an end face 3 of the welding nut 1, an annular attachment 4 is configured, which in the embodiment represented is square or rectangular in cross-section.

As indicated in dot-dash lines at the right in Fig. 1a, the attachment may alternatively be trapezoidal in cross-section for example. Depending on the material of the welding nut and the material on which it is to be welded, besides the cross-sectional shapes cited above, the annular attachment 4 may very well be triangular, tapering to a point or else for example rounded off at the end away from the end face 3.

The table reproduced below shows the dimensions in terms of the diameter D1 of the internal thread, the outside diameter D2 of the welding nut and the height H; the quantities D1, D2 and H are plotted in Fig. 1a. Here, the annular attachment, respecting all welding nuts entered in the table, both in height h and in width b, in each case amounts preferably to 1 mm.

Table:

D1	M3	M4	M5	M6	M8	M10
D2	8	8	10	10	12	14
H	5	5	6	6	8	10

As a comparison of the embodiments of the welding nuts in Fig. 1a and 1b will show, these are distinguished only in that in Fig. 1b, adjoining the annular attachment 4' in the end face 3', a groove 5' is configured, projecting into the

interior of the welding nut body 1', the dimensions of which groove are for example of the order of magnitude of the dimensions of the annular attachment 4'.

Fig. 2a, in section, shows a welding bolt 10 in the form of a hollow object with continuous internal thread 30, at the lower end (in Fig. 2a) of which a flange 50 is configured. This annular attachment, in departure from the one represented in Fig. 2a, may have a square or rectangular cross-section, as well as the cross-sectional shapes mentioned in connection with the attachment 4 in Fig. 1a.

In Fig. 2b, by contrast with Fig. 2a, a threaded bolt 10' of solid material with external thread 20' is represented, at the bottom end (in Fig. 2b) of which a flange 50' is configured. In the outer region of the flange end face 30' in Fig. 2b, again an annular attachment 40' is indicated, for example square or rectangular in cross-section. By a correspondingly large dimensioning of the diameter of the flange 50, 50', at the outer margin of which the annular attachments 40, 40' are configured, in terms of the diameter of the respective connecting elements 10, 10', i.e. by a correspondingly great distance between an annular attachment and the corresponding inside or outside diameter of a connecting element, it can be dependably ascertained that no weld splash or other welding material is in any way impairing the ability of the thread to function.

By the annular attachment 4, 4' in Figs. 1a, 1b, or 40, 40' in Figs. 2a and 2b, on the connecting elements there represented in the form of welding nuts or threaded bolts, a secure welding onto the annular attachment area of contact of the corresponding connecting elements, undercut-free and largely beadless

welding, even and especially on comparatively thin substrates in the form of sheet-metal, is attainable, where the past allowable maximum ratio of minimum sheet-metal thickness to bolt diameter of maximally 1:8 is not only realizable without difficulty but may even be easily fallen short of.

To prevent settling of weld splashes, for example on a continuous internal thread of a welding nut or on external threads of threaded bolts, advantageously, within and adjacent to the annular attachment 4' of a groove 5 projecting into the interior of the welding nut 1' in Fig. 1b or threaded bolts 20 and 20' in Fig. 2a, 2b, an annular attachment 40, 40' is provided on the outer edge of a flange 50, 50' configured on the threaded bolt 20, 20'.

Claims

1. Connecting element for use in bolt welding by means of short-time lift ignition, as in the case of T-bolts, threaded bolts, tubular hollow object such as internally threaded bushings, welding nuts and the like, **characterized in that** in the outer marginal region of an end face (3, 3') of the connecting element (1, 1'), an annular attachment (4, 4') is provided.

2. Connecting element according to claim 1, characterized in that, in the outer marginal portion of the end face (3') of hollow-object connecting elements such as welding nuts (1'), internally threaded bushings and the like, within the annular attachments (4'), a groove (5) running concentric thereto and extending into the connecting element (1') is configured.

3. Connecting element according to claim 1, characterized in that, at one end, a connecting element (10) in the form of a hollow object with continuous internal thread, a flange (50) is configured, at whose outer end face margin (30), an annular attachment (40') is provided.

4. Connecting element according to claim 1, characterized in that at one end of threaded bolts (10') of solid material, a flange (50') is configured, at whose outer end face margin (30') an annular attachment (40') is configured.

5. Connecting element according to any of claims 1 to 4, characterized in that the annular attachment (4; 40; 40') is square or rectangular in cross-section.

6. Connecting element according to any of claims 1 to 4, characterized in that the annular attachment is trapezoidal in cross-section.

7. Connecting element according to either of claims 1 and 2, characterized in that the annular attachment is of triangular configuration or tapering to a point.

With 1 sheet of drawings.

Nummer: DE 42 22 664 A1
Int. Cl.[5]: B 23 K 9/20
Offenlegungstag: 13. Januar 1994

Fig. 1a

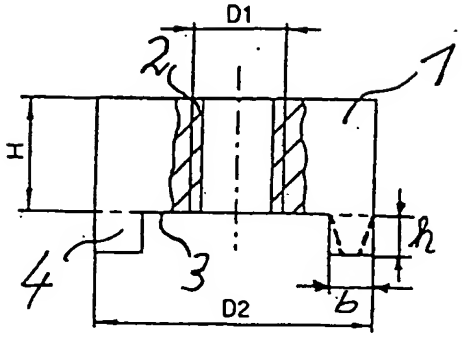

Fig. 1b

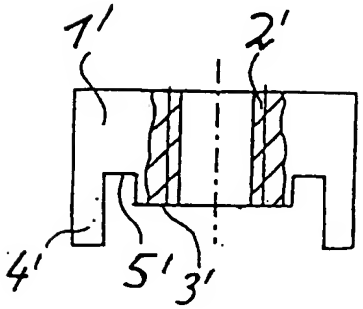

Fig. 2a

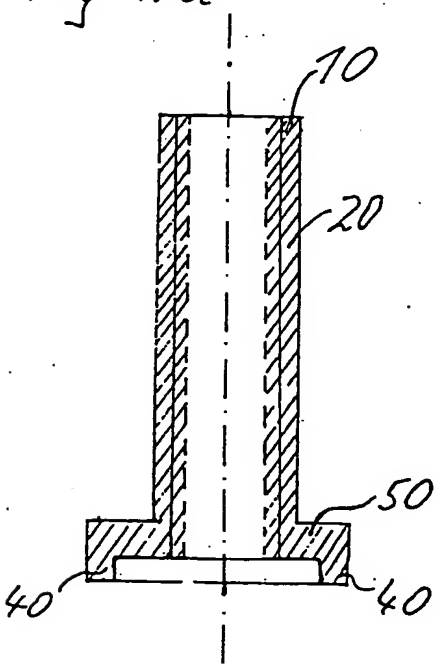

Fig. 2b